Complementary Study of Optimizing a Wool Dyeing Process with Commercially Available Liposomes

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Textile Research Journal 1999; 69; 789
DOI: 10.1177/004051759906901014

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Manuscript received June 5, 1998; accepted September 1, 1998

Letters to the Editor

Complementary Study of Optimizing a Wool Dyeing Process with Commercially Available Liposomes

September 15, 1998

r Sir,

extile Research Journal recently published our optiation study of the wool dyeing process with an azoic metal complex dye, using commercially available somes [1]. In this study, we concluded that simply ng phosphatidylcholine liposomes to the dye bath (as ılternative to the dye auxiliaries currently used) is ıble at the pilot plant scale for dyeing untreated wool ıs at lower temperatures and shorter times than led in conventional wool dyeing with the azoic metal plex 1:2 dye Lanaset Yellow 2R.

atisfactory levels of dye exhaustion and fixation as as good mechanical properties and handle obtained ı this new process at 80°C led us to design a comıentary study spreading the range of dye concentras (0.2 to 3.0% oww) and reducing the range of some concentrations (0.2 to 1.0% oww) with 80°C as final temperature.

/ool yarn samples were dyed at 80°C with the azo ıl complex 1:2 dye Lanaset Yellow 2R at three :entration levels (0.2, 1.6, and 3.0 %oww). The dye- contained the liposome AAL-100, also at three :rent levels of lipid concentration (0.2, 0.6, 1.0% oww) following the experimental 3^2 factorial and the conditions of our previous work [1]. We measured the experimental responses corresponding to dye exhaustion *De* (%), dye fixation *Df* (%), yarn tenacity *Te* (cN/tex) yarn elongation *El* (%), and yarn to yarn friction *Yf* (cN) as described in the previous work [1].

We identified the significant variables and obtained second-order polynomial models to explain the relationship between liposome concentration *Lc* and dye concentration *Dc* on bath exhaustion *De*, dye fixation *Df*, and other mechanical properties of the yarns. For the sake of brevity, only the surface responses of dye exhaustion and dye fixation are shown (Figures 1 and 2, respectively).

Dye exhaustion increased when both dye and liposome concentrations decreased. At lower dyestuff levels, however, the influence of liposome on dye exhaustion was not significant. It is important to emphasize the values of percent dye exhaustion, always higher than 90%, even at high dye concentration levels, bearing in mind that the dyeing process reached only 80°C.

Dye fixation increased with dye concentration and decreased with liposome concentration, although the influence of liposomes on dye fixation was not significant at high levels of dye concentration. Note that in all cases,

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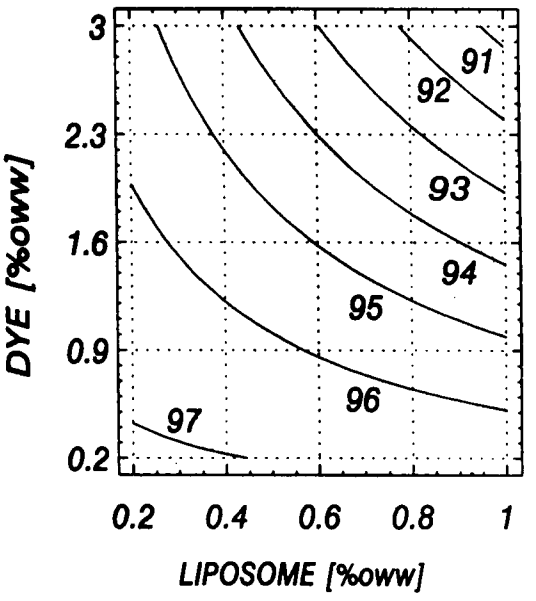

FIGURE 1. Influence of dye and liposome concentration on exhaustion of Lanaset Yellow 2R dye on untreated wool samples. Final dyeing temperature 80°C.

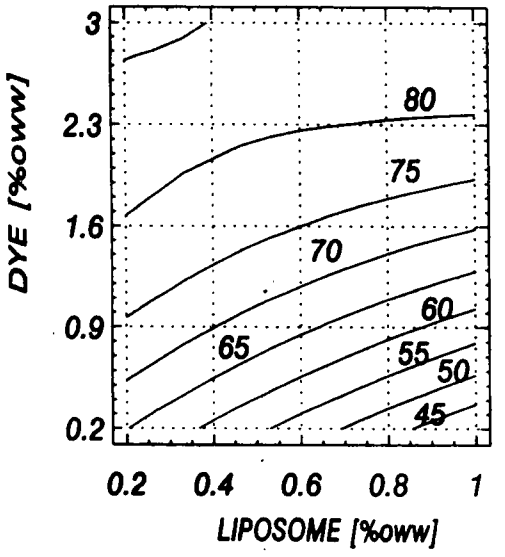

FIGURE 2. Influence of dye and liposome concentration on fixation of Lanaset Yellow 2R dye on untreated wool samples. Final dyeing temperature 80°C.

the level of fixed dye was acceptable for all liposome concentrations studied.

Neither dye nor liposome concentration revealed influence on yarn tenacity. Yarn breaking elongation only affected by dye concentration: this parameter creased when dye concentration increased. The hai was considered to be excellent by expert assessors. V yarn-to-yarn friction, we detected a significant influe only of liposome concentration.

In light of our optimization study, we can concl that the use of commercially available PC liposo simply added to the dyebath (as an alternative to the auxiliaries used to date) is suitable for dyeing wool y at temperatures lower than those used in conventi industrial wool dyeing with the azo metal complex dye Lanaset Yellow 2R. Thus, wool can be dyed at 8 with these liposomes in a wider range of dye concer tions with an optimum liposome concentration lo than 1% oww and with satisfactory levels of dye exh tion and fixation as well as good mechanical prope and handle. It is important to emphasize the dye exh tion percent, always higher than 90%, at this low dy temperature of 80°C, even at high dye concentra levels.

ACKNOWLEDGMENTS

This work was supported by funds from the C Project (BES2-2213, 1996)(Brite Euram III) and f the Petri Project (95-00580P, 1995) (CICYT), Spain. acknowledge the expert technical assistance of Mr von Knorring.

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